MORPHOLOGICAL STUDY OF RICE STARCH GRANULES DURING *IN VITRO* DIGESTION

Fernandes JM[1]*, Madalena DA[1], Pinheiro AC[1], Vicente AA[1]
* jmichel@ceb.uminho.pt
[1] Center of Biological Engineering, University of Minho, Braga, Portugal

Starch is the main sugar source present in staple foods, making it one of the most studied compounds in food industry. Understanding starch hydrolysis during digestion processes and the resulting glucose release can be important to strategically modulate starch digestion/glucose absorption processes. For this reason, rice starch digestion was performed using the harmonized *in vitro* gastrointestinal method and its structure analysed using fluorescent microscopy for correlation with the glucose release during the process. Briefly, white rice was cooked in an electric pan and passed through a food grinder. Samples were placed in a shaking water bath at 37 ºC and summited to oral, gastric and intestinal phase, with addition of fluids, enzymes and salts accordingly. Samples were collected at the final of the oral phase (2 min) and each 30 min afterwards. These were stained with fluorescein-isothiocyanate and prepared for fluorescent microscopic analysis. In our initial samples, rice starch granules (RSG) were visible in high quantities with well-defined hexagonal shape and size between 50 to 56 µm. After 60 minutes RSG dimensions or quantity did not change significantly. However, after 90 minutes, RSG degradation was evident and RSG size decreased to 45 µm. In the end of the gastric phase substantially lower RSG quantities were visible. RSG degradation peak occurred at 150 minutes. This result was correlated with the maximum percentage of released glucose (11.7 %) and hydrolysed starch (37.3 %) achieved in the same

period. Until the end of the digestion, lower quantities of RSG were observed presenting undefined structure and sizes. By the end of digestion 37.3 % RSG was hydrolysed and size decreased approximately 20 %.

This work has allowed to describe, both qualitatively and quantitatively, the fate of a food (rice) during digestion, thus establishing the procedure for further determinations under different conditions, rice types and cooking methods.